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March 1, 1958

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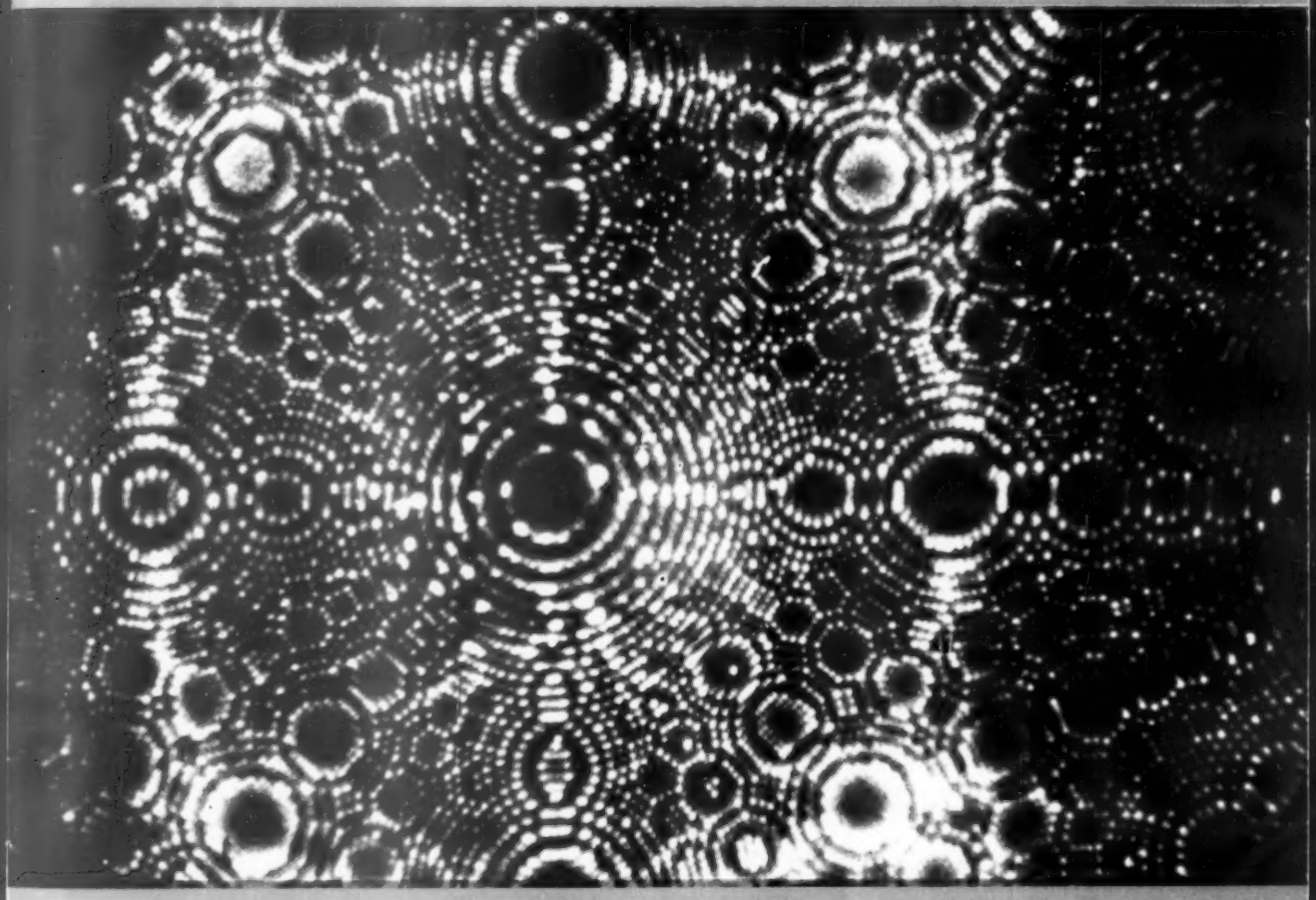
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Atomic Lace

See Page 131

A SCIENCE SERVICE PUBLICATION

Where does progress begin?

Kendall Preston Jr., S.M. in engineering from Harvard University . . .
graduate of the Laboratories' Communications Development Training Program.

Progress begins in the mind—in the perception and appreciation of new ideas. In the past the ideas that sparked progress too often had to wait on the random interest of genius. Today more and more new ideas come from men trained to an awareness of that which is yet to be accomplished.

At Bell Laboratories, communications science is entering upon its most challenging era in history. As never before, progress will depend upon men who have acquired the special training needed to think creatively in this exciting field.

Bell Laboratories provides the young college graduate with unique opportunities to develop his creative abilities. During his first two years, he spends two or three days a week as part of his job, taking postgraduate courses in basic mathematics, physics and electronics. This he does at a graduate study center which has been established at the Laboratories by New York University. As he gathers a broad fundamental knowledge which will enable him to tackle every type of communications problem, he also gathers credits toward advanced degrees. To round out his education, he spends a third year on special phases of communications technology.

By helping scientists and engineers to reach their top development, Bell Laboratories has helped to make your telephone system the world's best—and will keep it so.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

MEDICINE

New Aids for Heart Study

Studies of the circulatory system and the heart itself are providing the medical scientist with new insights into the nature of the heart and how it functions.

➤ THE INTRICATE chemical testing technique used for investigating deaths by poisoning was demonstrated to the New York Heart Association as a new means of studying the characteristic patches or plaques, resulting from atherosclerosis, that roughen and narrow the inside channel of arteries.

Dr. Charles J. Umberger, toxicologist for the city of New York, exposed the plaques to solvents to obtain all extractable material. Both the soluble materials and the residue were then subjected to various instrument inspections to record tiny amounts of metals, liquids and other component parts of the plaque.

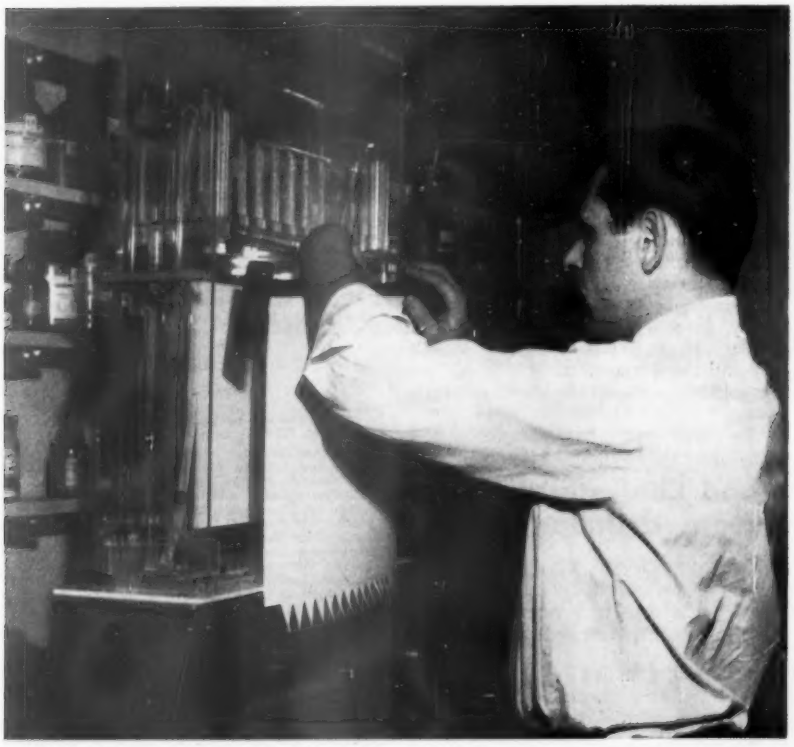
The major results of this system for testing the plaques reveals that the contents of the plaque are not as complicated as expected and it is believed to be a chemical problem capable of solution. If further studies are made, Dr. Umberger said, it may be possible to accumulate more evidence and some leads to the genesis of atherosclerosis.

Muscle Study

➤ MORE STUDY on ways to improve the heart's pumping action in cases of congestive heart failure was urged by Dr. Louis Leiter of Montefiore Hospital, New York, in a demonstration for the Heart Association.

These new studies, he said, will stress the importance of improving pumping action since the known drug aids have been used extensively and have proved to be only adequate.

Dr. Leiter and his associates studied the effects of acidity and alkalinity, sodium intake treatment and bandaging the legs in relation to fluid intake and kidney disorders. Their results show that the measures do not cure heart failure, the inability of the heart to pump sufficient supplies of blood, but merely alleviate some of the discomforts which are a result of heart failure.



FAT IDENTIFICATION—Identification of the ingredients of the fatty patches that form in hardening of the arteries is made through the use of ionophoresis. Dr. Leo A. Dal Cortivo, toxicologist for New York City, sets up the apparatus for demonstrating the process of ionophoresis. Material for separation is put in tubes at the top. It drips down the paper, across which an electrical current flows. This causes the fractions to separate, ending up in tubes at the bottom as separate substances.

Heart Operation Success

➤ A TECHNIQUE to measure the quantity of additional blood brought to the heart by various surgical procedures has been developed by a New York University group.

A demonstration for the Heart Association evaluated the effectiveness of various operations designed to bring new blood supplies to the heart. Many of the operations, this method showed, do not aid the heart in its quest for more blood.

The method, used on animals, consists of diverting all blood from the heart by means of a heart-lung machine. The pulmonary artery is blocked off by inflating a small balloon after it has been inserted in the artery.

A tube, inserted into the right ventricle, will then collect only that blood which is carried there by the only source of inflow, that which comes from the operation.

This measuring technique has determined that the only successful operation of those intended to increase the heart's blood supply is the surgical procedure by which the pericardial sac is made to adhere tightly to the heart muscle. The tests showed, in four of the six experimental animals, that this operation was responsible for a flow equal to three to five percent of the normal total coronary flow.

Preliminary results from this study show that mammary artery ligation, tying off part of the internal mammary arteries to divert additional blood to the heart, does not bring new blood to the heart.

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PHYSICS

Show Single Atoms In First Atomic Film

See Front Cover

➤ THE FIRST atomic motion picture, showing the surface of a tiny platinum crystal as it appears on the screen of a low temperature field ion microscope, was demonstrated to the American Physical Society meeting in New York. (See SNL, April 6, 1957.)

The photograph on the cover of this week's SCIENCE NEWS LETTER is one shot from this film. It shows the crystal lattice of a platinum hemisphere with a diameter of approximately 1,000 angstrom units or 1/100,000 of a centimeter. Each fine dot is a single atom of 2.7 angstroms diameter. In the film the actual movement of atoms is seen as they evaporate at −420 degrees Fahrenheit when a field of 700,000,000 volts per centimeter is applied.

Dr. Erwin Müller, assisted by J. Mulson, is carrying on the research at the Pennsylvania State University.

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EDUCATION

College Selection Hints

➤ MANY THOUSANDS of young students are knocking on the doors of colleges and universities to gain admittance to courses that will train them to become scientists and engineers.

The colleges have highly perfected methods of picking the students of ability and promise they wish to admit. But how does the potential student pick the college that will train him effectively?

Here are some suggested criteria for use by high school students and their parents in judging undergraduate colleges:

Are adequate courses offered in mathematics, physics, chemistry, zoology, botany and geology?

How good is the science faculty? Are the professors nationally recognized? This can be determined by checking the list of faculty and determining the number in the standard biographical volumes, *American Men of Science* and *Who's Who*. How many are in academies in which membership is a recognition of attainment? How many hold honorary degrees?

What alumni are eminent in science?

Are there separate buildings for science laboratories?

Does the university or college have current research projects and is it receiving grants from government and foundations or both?

Does the institution confer the bachelor of science degree?

Is the institution on the approved list of accrediting associations?

Some of the factors that are not important in determining the science standing of an undergraduate college include:

The success of its athletic teams in intercollegiate competition.

Its geographical location.

Its size, although it should be large enough to command a specialized science faculty.

Whether or not the institution gives graduate courses leading to advanced degrees, since there are some very adequate colleges that confine themselves to undergraduate courses.

Whether or not the college is coeducational.

Whether or not father, mother, other relatives or friends were graduated from the institution.

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BIOPHYSICS

Identification by EEG

➤ USE OF AN electronic computer to identify individuals by their brain wave patterns was described to the Biophysical Society meeting in Cambridge, Mass. The computer is programmed to describe numerically the complex wave forms found in electroencephalograms or EEGs.

Although it has long been recognized that each person has his own brain wave signature, a characteristic EEG pattern that appears when he is awake and resting under standard conditions, there has been no exact or quantitative way of describing it. Judgments of which characteristics of the EEG wave form change significantly from person to person have had to depend in the past on the skill of experienced EEG technicians.

Now, in the study made by a team of Massachusetts Institute of Technology scientists, the Lincoln TX-O electronic computer has been used to measure a number of the characteristics of EEG wave forms and their variability. Primary attention was paid to the behavior of "bursts of alpha activity," as they were defined by the computer program.

The MIT team reported the computer was able to identify the first 20 subjects tested on the basis of their EEG patterns. Moreover, preliminary studies show the computer is also able to distinguish between different physiological states in the same individual.

The most important application of this technique, the scientists explain, is the identification of whether an individual is in the same or different physiological states at two different times. This will make possible better control of EEG experiments, and it may also give valuable information about the physiological effects of drugs, fatigue, and other factors that affect the functioning of the brain.

Participating in the study were B. G. Farley, L. S. Frishkopf, M. Freeman, C. Molnar and T. Weiss of Lincoln Laboratory and the Research Laboratory of Electronics, Massachusetts Institute of Technology.

Science News Letter, March 1, 1958

MEDICINE

Blood Cholesterol Level Increased Under Stress

➤ THE BLOOD'S cholesterol level is higher in persons under emotional and mental stress than it is when these same persons are engaged in their normal activities.

Cholesterol, a fat-like substance, has been charged by some medical scientists with causing atherosclerosis, a form of hardening of the arteries.

A "significant increase" in blood cholesterol was found to accompany the mental and emotional stress of examination week in a group of 44 apparently healthy male medical students. The mean value was an increase of 11% during the examination period over the value when the students were free of examinations for at least a week before and after the samples were taken.

There is less than one in a thousand chances that this increase would occur by chance.

Those participating in the study ranged in age from 21 to 37, the mean age being 25. One individual showed a "remarkable increase" of cholesterol level on two days during the examination period, double that found during the control period.

The studies were made by Drs. P. T. Wertlake, A. A. Wilcox, M. I. Haley and J. E. Peterson of the College of Medical Evangelists, Loma Linda, Los Angeles, who report their results in *Proceedings of the Society for Experimental Biology and Medicine* (Jan.).

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ASTRONOMY

Study Arizona Crater

➤ THE METEORITE causing the world's largest meteoritic crater in Arizona probably hit the earth from a southwesterly direction.

When it struck, large quantities of meteoritic material were pitched forward to the positions where they are now found. These are the conclusions of Dr. John S. Rinehart of the Smithsonian Astrophysical Observatory and Harvard College Observatory, Cambridge, Mass.

His "highly reasonable" theory resulted from the most extensive survey yet made on the distribution of meteoritic debris around the crater. The Arizona meteorite crater is the world's largest crater known with certainty to have been caused by the smashing impact of a meteorite.

It is a large bowl-like depression lying in a sandy semi-arid region of northern Arizona. In outline, the crater is a rough square, about 4,100 feet across and 600 feet deep, with an elevated rim rising 160 feet above the surrounding plain.

The crater has been well-known since 1870, and has been the object of numerous surveys since then.

Dr. Rinehart's survey was aimed at trying to fix the mass of the meteorite that made the crater and its direction of flight. Some 700 soil samples were collected and analyzed to find the distribution of the tiny bits of meteoritic material scattered for several miles around the crater.

He developed a new method for separating the strongly magnetic particles of meteoritic origin from the weakly magnetic ones of earthly origin. The 700 samples analyzed were taken from a grid, with the crater as its center, approximately 80 square miles. The locations were separated by about one-half a mile, and two samples, 20 feet apart, were taken at each location.

In addition, to study the vertical distribution of material, soil samples from every few inches along the wall of a hole driven to bedrock were taken at 25 locations.

After studying the distribution pattern, Dr. Rinehart concluded that the meteorite must have been almost completely shattered when it struck, with pieces weighing a thousand pounds downward. Whether a large mass still remains buried beneath the crater is unknown.

Science News Letter, March 1, 1958

NATURAL RESOURCES

Chemicals Kill Lampreys

➤ SIX CHEMICALS that kill sea lampreys, even in small doses, but do not seem to harm game fish have been discovered.

These chemicals should be even more effective in actual streams than they are when tested under laboratory conditions, three scientists suggest in *Science* (Feb. 14).

The sea lamprey is a predator living off other fish, to which it attaches with a sucker-like mouth, then rasps away the flesh with a circle of razor-sharp teeth. The sea lamprey invasion of the Great Lakes has whittled down the once heavy game fish catch to a mere trickle, and cost the fish industry untold millions.

Many methods have been tried and many more are being tested in the anti-lamprey campaign. The most promising one for immediate control is application of toxic chemicals while the sea lampreys are in the larval stage in inland streams and before they begin their existence as parasites.

Six mononitrophenols containing halogens have been found "significantly more toxic" to sea lamprey larvae than to fish or other water organisms. These chemicals are equally or more effective when used as sodium salts, it was found by Drs. Vernon C. Applegate and John H. Howell of the U. S. Fish and Wildlife Service, Rogers City, Mich., and Manning A. Smith of Bucknell University, Lewisburg, Pa.

In work supported in part by the Great Lakes Fishery Commission, they tested different concentrations of the chemicals in laboratory jars, using sea lamprey larvae and fingerlings of such game fish as rainbow trout, brown trout and bluegill sunfish. In every case a much higher concentration of the chemical was needed to kill ten percent of the fish than to kill all of the larvae, double or more the amount in most cases.

The scientists then constructed a running water runway in which natural stream conditions were duplicated and tested two of the compounds. These experiments showed the "toxic effects of each of the substances upon fishes seemed to be considerably less" than effects observed under laboratory-jar test conditions.

Some species of fishes used in the running water tests showed susceptibility to concentrations of chemical ranging from 20 to 40 parts per million. Yellow perch, white suckers and bullheads suffered significant mortalities at these higher concentrations.

In the lab tests, several of the compounds killed all the lamprey larvae in less than 45 minutes with no apparent harm to game fish exposed to the same concentrations for 24 hours.

At least six generations of larval sea lampreys live in the stream in which they are spawned before migrating to their parasite existence in the Great Lakes. With the present method of blocking streams with electrical barriers that kill or repel adults before they reach spawning grounds, as much as seven years may pass after all suitable streams are blocked before the lamprey population in a lake shows any marked decrease.

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● RADIO

Saturday, March 8, 1958 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Dean Roberts, executive director, The National Society for Crippled Children and Adults, the Easter Seal Society, will discuss "Aid for the Crippled."

GYRO BREAKTHROUGH—Gyroscopes, like the one being checked in the photograph by Speery Gyroscope Company engineer John Wilson, can be improved in performance more than 1000%, it is reported.

TECHNOLOGY

Develop Gyroscope With Virtually Perfect Accuracy

➤ GYROSCOPES with virtually perfect precision for extremely accurate guidance of missiles and aircraft have been developed by the Sperry Gyroscope Company, Great Neck, N. Y.

The high accuracies achieved by the gyros result from constant rotation of the ball bearings in the gimbals on which the gyro is suspended. Gyroscopes are devices with finely balanced spinning wheels that have an inherent ability to point continuously to a fixed position in space. They form the heart of virtually every shipboard and airborne navigation system, compass, bombing and fire control systems.

Used with computers and Doppler radars, which measure speed, gyros can provide for pinpoint navigation anywhere on earth without assistance from ground radio aids. Teamed with computers and accelerometers, gyros hold the key to navigation in outer space.

The principle of the new development is called Rotorace. In initial use, it has reduced random drift rate to a quarter of a degree per hour from the usual three or more degrees hourly.

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METEOROLOGY

Weather May Be Warming

Despite the recent cold wave that hit the eastern part of the nation, meteorologists are continuing to find evidence of a general warming up with higher average temperatures.

➤ ALTHOUGH the two-thirds of the nation east of the Rocky Mountains that shivered in the season's worst cold wave during the better part of February may find it hard to believe, the Northern Hemisphere averaged nearly two degrees warmer than usual for the period from mid-January to mid-February.

This higher-than-usual average results from the fact that the planet-wide circulation was locked in a stable pattern, with cold pools of air far to the south offset by warm pools of air to the north.

In spite of the severe cold that hit much of the nation, particularly the Southeast, there is no evidence winters are growing colder. One hard winter, resembling those remembered from childhood or the traditional ones from grandfather's day, does not represent a trend, Jerome Namias, chief of the U. S. Weather Bureau's extended forecast section, Suitland, Md., said.

He pointed out that one winter does not mean a change in climate any more than "one swallow makes a spring."

Actually, there is good evidence that average temperatures have increased a little more than two degrees since the turn of the century. Not only thermometer readings averaged over the years but receding glaciers indicate the warm-up, which is more pronounced in the northern latitudes of Greenland and Alaska, etc., than at lower latitudes.

Why the world is warming up, at least in the Northern Hemisphere, is not known, but three theories each have supporters.

The first proposed explanation is that the carbon dioxide poured into the atmosphere by a booming industrial civilization could have caused the increase. By burning up about 100 billion tons of coal and oil since 1900, man himself may be changing the climate. Carbon dioxide and water vapor in the earth's atmosphere act like a greenhouse, trapping heat.

Another explanation is that the warm-up is associated with changes in the sun's radiation over a long period. Some have even suggested there is an 80-year sunspot cycle during which the sun's tremendous outpouring of energy rises to a high point, falls, then rises to another high point.

A third explanation is that the dust and ash thrown high into the atmosphere by exploding volcanoes remain there to drift around the world, acting as a cover to shield from the sun's radiation. This shielding effect paradoxically results in higher average temperatures.

The 30-day average temperature increase to mid-February computed by Mr. Namias is a short-term, not a long-period, effect.

It covers only the lower third of the atmosphere, and is as accurate as the available data allow.

Mr. Namias said the temperature averages could be broken down into several zones. From 45 degrees north latitude northward, the month-long temperature rise was nearly three degrees Fahrenheit. Between 30 and 40 degrees north latitude, the average was about one degree colder than normal. In latitudes about 20 degrees north, the average was about two degrees above normal. Elsewhere, average temperatures were near normal.

The normals are based on close to 30 years of world-wide temperature readings.

The very stable circulation pattern resulting in the cold air pouring down into the country's midsection and Southeast is sure to shift in March due to the natural warming of the atmosphere by the sun as spring arrives.

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GEOPHYSICS

Arctic Ice Island Has Record Low Temperature

➤ THE ARCTIC ice island T-3 hit a record low of 64 degrees below zero Fahrenheit on Jan. 4, the U. S. National Committee for the International Geophysical Year, or IGY, has reported.

Only 20 days later, thermometers read 23 degrees above zero. Mean temperature for January was minus 23 degrees, compared with minus 40 degrees for December.

On Jan. 2, the island's position was 80 degrees, 39 minutes north, and 112 degrees, 55 minutes west. During the month a series of high winds moved it eastward to approximately the same position it had occupied in late November.

T-3 is a 36-square-mile ice island that originated from fresh water shelf ice. It was first occupied by Air Force scientists in 1952 and was reoccupied in May, 1957, by IGY scientists at Station Bravo, one of two drifting stations in the Arctic Ocean.

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METEOROLOGY

Cloud Cover Survey Supports Rain Theory

➤ A SURVEY of high-level cloud cover over Australia supports the theory that when meteoritic dust sifting down through the earth's atmosphere hits just the right weather conditions, a heavy rainfall follows.

Dr. E. K. Bigg of the Commonwealth Scientific and Industrial Research Organization, Sydney, examined records of cirrus clouds for 18 representative Australian stations for the last few days of December, January and the first few days of February during the period from 1939 to 1956. He found that the cloud cover was much higher than usual each year on Dec. 28, Jan. 12 Jan. 22 and Feb. 1.

These are the same days on which Dr. E. G. Bowen, director of the CSIRO's radiophysics division, found rainfall was particularly high. Dr. Bowen therefore suggested the high rainfall peaks occurred a month after a meteor shower, resulting from the seeding of clouds by tiny particles of meteoritic dust.

Such seeding could also affect the occurrence of cirrus clouds, Dr. Bigg reports to fellow weathermen in the *Journal of Meteorology* (Dec. 1957), bimonthly publication of the American Meteorological Society.

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ENGINEERING

Electric Cable Steers Auto Automatically

➤ AN AUTOMATICALLY guided automobile cruised along a one-mile check road at General Motors Technical Center, Warren, Mich., in a demonstration of what may be in the future for highway driving.

Dr. Lawrence R. Hafstad, vice president in charge of the GM research staff, said the demonstration car was guided by a combined electronic computer and servo mechanism which takes over human steering control by following a magnetic path produced by low frequency power in an electrical cable under the highway.

"Our particular system," he said, "is still in the research stage and as yet is limited to steering control." It does, however, point to the possibility of a built-in guidance system for tomorrow's highways.

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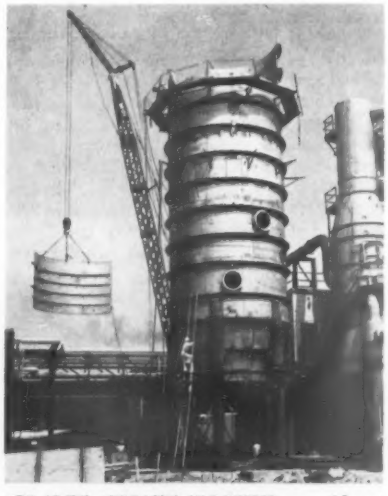

GIANT CRYSTALLIZER — About 300 tons of ammonium sulfate, a fertilizer, can be made daily in this stainless steel crystallizer. It weighs more than 150 tons, is 82 feet high with a 20-foot diameter. Allegheny Ludlum Steel Corporation supplied the steel for the crystallizer which is being built in Hopewell, Va. for the National Aniline Division of Allied Chemical & Dye Corporation.

PUBLIC HEALTH

Ask Control of Bad Air

The problem of polluted air extends beyond state borders. In one effort to work effectively toward a solution, two states may soon form an interstate agency.

➤ THE INTERSTATE Sanitation Commission, composed of health authorities from Connecticut, New Jersey and New York, has proposed creation of an interstate agency to cope with the growing problem of bad air, some of it dangerously polluted, drifting over the New York City-northern New Jersey metropolitan area.

The Commission points out in a report issued in New York that economic losses caused by air pollution damage to buildings, paint, clothing and vehicles are "enormous." In addition, the Commission reports, "health may be adversely affected."

Aircraft flights in the huge metropolitan area "are hampered by poor visibility brought about by air pollution," the Commission also reported to the governors and legislatures of New York and New Jersey, the two states most concerned.

On the basis of atmospheric tracer tests that showed each state was polluting the other, the Commission recommends creation of an interstate control group similar to the group now controlling pollution of rivers and streams shared by the states in the area.

The report is based on tests made during the summer and fall of 1957 in cooperation with four Federal agencies: Public Health Service, Weather Bureau, Army Chemical Corps and National Bureau of Standards.

During the tests a zinc cadmium dust, easily spotted by its fluorescence and by chemical means, was dispersed into the air at various locations. Air was spot-checked over both states and the travel of the dust was mapped.

The tests indicated air-carried pollutants spread mutually over the two states, depending on wind direction and weather conditions.

Since it is impractical to try to clean the air once it has been polluted, the Commission concludes the only helpful measure is to control air pollution at its source by regulation of smoke-producing factories, incinerators, refuse dumps, automobile traffic, etc. However, nothing would be gained if only one state invoked controls and conducted an education campaign. Bad air still would flow in from any neighboring area not fighting air pollution.

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SERGEANTS AT WORK — The U. S. Army's new surface-to-surface "Sergeant" missile blasts off during a recent test flight at White Sands Proving Ground, N. M. The missile is said to be capable of being fired under all conditions of weather and terrain by a very small crew. Its highly accurate guidance system is invulnerable to possible enemy counter-measures, reports the Sperry Gyroscope Company, N. Y., which will produce the missile system.

PUBLIC HEALTH

Protection From Radiation

A new linear accelerator being built at the Argonne National Laboratory will help scientists learn what happens to living cells that are exposed to radiation.

➤ BETTER PROTECTION against nuclear radiation hazards is expected to result from studies with a new high energy electron accelerator scheduled for completion at Argonne National Laboratory, Lemont, Ill., this fall.

Scientists will use the accelerator to learn more precisely just what happens in a chemical reaction set off by atomic radiation. At present, chemists have only a general notion of what happens to many life processes when nuclear radiation enters the scene.

Scientists know what materials are present in a normal body cell, and they have identified the substances present after the cell has suffered radiation damage. However, the very rapid steps and the short-lived intermediate compounds formed during radiation exposure remain, for the most part, a mystery.

Using the linear accelerator, the Argonne chemists will make a direct frontal attack on the problem of producing, isolating and identifying the intermediate compounds.

The accelerator, under construction by Applied Radiation Corporation, Walnut Creek, Calif., will fire short, very intense bursts of electrons at cells and chemicals present in living organisms, creating enough of the intermediate materials to identify them.

When the method of radiation damage thus becomes more fully understood, chemists will then seek substances that, when injected, can either prevent the formation of the intermediates, or can combine with them to produce harmless materials.

For example, scientists have pointed out, some sugars recently have been found to reduce radiation effects in certain cases. How the sugars act is not known, but when chemists have identified more of the intermediate radiation products, they may be able to find a specific sugar or even more effective chemicals to pull the harmful intermediates out of the scene, thus stopping the cell damage process.

Argonne scientists believe knowledge gained from the accelerator experiments also will prove useful in producing new chemical products and in preserving foods by radiation.

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PUBLIC HEALTH

Form U. S. Committee On Radiation Hazards

➤ A NATIONAL Advisory Committee on Radiation to develop adequate safeguards against radiation hazards has been established by the U. S. Public Health Service.

Dr. Leroy E. Burney, the Service's Surgeon General, said the committee will advise him on programs concerning the public health aspects of radiation from all sources. Present activities of the Service in this field include research, epidemiological studies, radiation monitoring of milk, water and air, and technical assistance to the states on radiation safety measures.

Dr. Russell H. Morgan, professor of radiology, Johns Hopkins University Medical School, and radiologist in chief of Johns Hopkins Hospital, now serving as special consultant to the Surgeon General on public health aspects of radiation, will be chairman of the new committee, which will hold its initial meeting March 13.

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MEDICINE

Radioactive Gas Tracer Aids "Shunt" Detection

➤ A RADIOACTIVE GAS tracer can detect blood leakage, or holes between the heart chambers, Dr. Robert B. Case and his associates at St. Luke's Hospital, New York, report. They used ethyl iodide tagged with radioactive iodine which the patient inhaled.

The patient breathes the gas for 15 seconds after which it is absorbed by the blood and travels to the left side of the heart. If there is a hole between the chambers of the heart, a quantity of the tracer blood shunts across to the right side of the heart where samples are rapidly drawn off.

This tagged blood, from the right chamber, is then compared with blood taken simultaneously from a leg artery. The amount of radioactive tracer found in the blood from the right chamber determines the amount of leakage, and thus the size of the defect.

Shunts, the physician's name for leakages within the heart, had previously been detected by having the patient breathe a mixture of the gas nitrous oxide and tracing its course through the circulatory system.

Another method employs a harmless blue dye injection into the blood stream while the standard method is to introduce a thin tube through an arm vein into the right heart chambers and draw off blood samples directly.

The advantage of the radioactive tracer lies in the fact that the size as well as the defect itself can be determined before surgery by comparing the count of the two blood samples.

The methods previously used were "hit and miss" or, if the defect was detected, unable to determine the size.

Science News Letter, March 1, 1958

GERIATRICS

Aged's Mental Health Better in Own "Home"

➤ OLD PEOPLE have better mental health, are more socially alert, less concerned with thoughts of death and less seclusive if they live in their own private apartments than if they are housed in the traditional old people's home.

This was found when residents of the two kinds of housing were interviewed and tested with personality and intelligence tests. The research is reported in the *Journal of the American Geriatrics Society* (Jan.) by Dr. Samuel D. Shrut of New York.

Both groups of old people were maintained by the Home for Aged and Infirm Hebrews of New York. One group lived in the traditionally institutional Central House where many of the residents live in nurse-supervised ward accommodations and where daily activities, including recreation, are supervised and where the residents may go out only on "pass."

The other group lived in an apartment house where each individual or couple occupies his or her own closed-door private rooms. All residents are free to come and go as they wish. They keep their own apartments in good order and furnished to suit their own taste. They, however, dine together in pleasant dining rooms with small tables for four diners each. They may also enjoy lounges for television, cards or movies or parties.

There is a need, Dr. Shrut stresses, for de-emphasis of mass-dwelling arrangements for aged persons. There should be provision of small unsegregated cottages and small apartments with the features the residents have been used to such as shopping areas, theaters, and other centers.

Institutional residences should not be considered as terminal residences. Old persons should be allowed to elect to leave them for as long as desired without forfeiting privileges of resumed residency.

Health and other services should be provided for the elderly without the necessity of their entering an old people's home. Research should be done on providing home care for the aged parallel to the similar foster care of children.

Science News Letter, March 1, 1958

PSYCHIATRY

Psychopaths Have Wonderful Memories

➤ PSYCHOPATHS have wonderful memories.

Scientific evidence that this group can remember longer and better than more normal individuals is reported in the *Journal of Personality* (Dec. 1957). The evidence was obtained in experiments conducted by Dr. Lewis J. Sherman of the Veterans Administration Hospital, Brockton, Mass., when he was with the University of Illinois.

The results confirm the impression of clinicians who report psychopaths are "able to relate early experiences endlessly during therapy sessions."

The psychopaths tested in Dr. Sherman's experiments were picked from among the criminals in the Illinois State Penitentiary at Joliet. They are the "tough guys," "trouble makers" and "bugs" who continually violate prison regualtions, spend long periods in solitary confinement and, the warden said, "are the men most difficult to manage."

They were given memory tests on both meaningful material and nonsense syllables and their achievement was compared with that of other prisoners not considered psychopaths and with neurotic patients at the VA Hospital in Danville, Ill.

The tests showed the psychopaths forgot significantly less than either the normal prisoners or the neurotics. The neurotics forgot more than the normals, but there was not too much difference between these two groups.

Dr. Sherman explains the excellent memories of the psychopaths as due to the fact that they have little if any anxiety. Anxiety seems to interfere with the retention of learned material.

Science News Letter, March 1, 1958

IN SCIENCE

TECHNOLOGY

Tiny X-Ray Unit Spots Flaws in Rocket Fuels

➤ A TECHNIQUE for locating potentially disastrous flaws in cast charges of solid rocket fuels has been developed by engineers who use a small "extension arm" of huge X-ray generators to photograph the fuel from inside out.

Until now inspection of cast solid fuels has been a difficult, costly process involving wrapping X-ray film around the cylinder of fuel and passing X-rays completely through the fuel. The X-ray intensity was greatly reduced by passing through the entire fuel thickness.

The new technique involves transmitting high voltages from a large Van de Graaff X-ray generator to a small electron tube inserted in the "burning hole" running through the center of the fuel charge. Because the X-rays start at the center of the charge and pass through only half the fuel thickness, penetration requirements can be cut by 50%, and clearer pictures result.

The technique was developed jointly by High Voltage Engineering Corporation, Burlington, Mass., Thiokol Chemical Corporation, Trenton, N. J., and Friez Instrument Division of the Bendix Aviation Corporation, Towson, Md.

Science News Letter, March 1, 1958

NATURAL RESOURCES

Detergent Helps Air Force Save Fish

➤ THE AIR FORCE is protecting fish and wildlife around its installations by scrubbing its airplanes with a detergent, similar to the familiar household product, instead of the kerosene-based cleaner that had been in use.

Besides reducing stream pollution, the Air Force is saving money and also getting a better scrubbing job.

It takes about 5,000 gallons of water to bathe the half acre of exposed surface on a B-52 Stratofortress, and it must be washed about once a month.

Until recently a kerosene-based solvent was used. However, the used cleanser running from airport drains was a potential threat to fish and wildlife living in or drinking from nearby streams. Until development of the new cleanser, the only solution to the problem appeared to be installation of costly solvent-recovery systems.

The new detergent, harmless to fish and wildlife, consists of alkaline phosphates, silicates and wetting agents similar to those in most household detergents, the Air Research and Development Command, Baltimore, Md., announced.

Science News Letter, March 1, 1958

ICE FIELDS

MEDICINE

Salivary Tumors Show In Blood Type 'A' Persons

➤ PERSONS with blood type "A" may be more susceptible to tumors of the salivary tissues than other blood types.

Evidence that indicates this susceptibility turned up in a study made by Dr. J. Malcolm Cameron of the University Department of Orthopedics, Western Infirmary in Glasgow, Scotland, and reported in the British medical journal *The Lancet* (Feb. 1).

Of 341 patients with tumors of salivary tissue, 206 or 60.4% were in group "A".

These findings, Dr. Cameron says, provide convincing statistical evidence of an unusually high incidence of blood group "A" in this series of patients with salivary tumors.

"This is all the more striking because in Scotland group "A" is found in a smaller proportion of the population than in England," he points out.

Dr. Cameron notes that recent investigations into the relationship between disease and "A-B-O" blood groups indicate that these groups are associated with susceptibility to some disorders and relative immunity to others.

Other scientists have shown statistically, for example, that the incidence of group "A" has also been found to be unduly high in patients with pernicious anemia, stomach cancer, and broncho-pneumonia in infancy.

Group "O," on the other hand, occurs with excessive frequency in persons with peptic ulcerations.

Science News Letter, March 1, 1958

GERIATRICS

Find Indicator to Causes Underlying Aging

➤ A POSSIBLE clue to part of the aging process and a lead to a way to keep bones young throughout life has been found.

The research, performed on rats by Dr. E. A. Tonna and his associates at the Hospital for Special Surgery, New York, N. Y., shows a chemical parallelism between respiratory enzyme activity and bone aging processes. As a person grows older the enzymes slow down in their activity.

From their studies, the New York research team has drawn this picture of the aging process as it relates to enzymes and bones:

There is a steady state of respiratory enzyme activity in the periosteum surrounding bone from birth to adolescence. After sexual maturity, however, there is a drastic reduction in the activity of the enzymes. This slow-down cuts the amount of energy available to the cells which is essential for their work, such as for the repair of damaged bone and for growth. This inability of the bone to stay young is somehow directly or indirectly related to enzyme activity.

"What we have seen in our studies," Dr. Tonna told SCIENCE SERVICE, "is a reflection or mirror-image of something else happening somewhere farther back in the chain of events that contribute to the aging process of the periosteum.

"If we can discover this 'something else' and tell why and how it affects the bone later on, we might be able to reverse the process. This is our hope."

It has also been noted in the studies that as an animal ages there is a loss in the ability to re-activate the site of bone repair. It never reaches the level noticed in young animals, and shows up as a progressive loss.

Dr. Tonna was extremely cautious in pointing out that these are preliminary findings and more research into the nature of enzymatic effects on aging will have to be studied.

"But," he stressed, "the finding is a valuable indicator to the underlying causes behind aging."

Dr. Tonna reports the findings in *Nature* (Feb. 15).

Science News Letter, March 1, 1958

ICHTHYOLOGY

Tuna Larvae Discovered Off Washington Coast

➤ TUNA LARVAE, fish in the early stages of development, have been taken off the Washington coast for the first time. The species of tuna is not yet known, Dr. Richard H. Fleming, executive officer of the department of oceanography at the University of Washington, Seattle, reported.

Tuna larvae were found among the more than 5,000 fish taken on the return cruise from the Aleutians and the Bering Sea by the "Brown Bear," research vessel of the oceanography department. Research instructor William I. Aron at the University supervised the studies.

The cruise was part of the oceanography studies for the International Geophysical Year.

Ten specimens of the tuna larvae, some 10 to 15 millimeters in length, were taken in water with a temperature of 55 degrees to 60 degrees Fahrenheit, 60 to 400 miles west of Cape Flattery.

The larvae have been sent to the Pacific Oceanic Fishery Investigations of the U. S. Fish and Wildlife Service in Honolulu, Hawaii, for identification.

The find may aid considerably in solving some tuna secrets, unknown facts that have many times left commercial fishermen and cannery operators in an expensive quandary. Some years the valuable, white-meated albacore tuna appear in very great numbers off the Oregon and Washington shores and some years not at all. "Why" is not known and the prized albacore has remained the "mystery fish" of the Pacific Ocean.

Areas of spawning for the albacore tuna are not known, nor have larvae or immature fish been found, nor is it known where the tuna go after their sometimes July to October appearance off the Oregon coast.

Science News Letter, March 1, 1958

PLANT PHYSIOLOGY

Effects of Gibberellin Vary With Plants

➤ GIBBERELLIC acid, a growth promoting substance originally isolated from rice, may not always increase a plant's growth.

The chemical may cause an increase in growth, a decrease or, even, have no effect at all, Dr. L. G. Nickell of the phytochemistry laboratory at the Chas. Pfizer and Co., Inc., Biochemical Research and Development Division, in Brooklyn, N. Y., reports. Each of four different plants reacted differently when gibberellins were added to their food.

All the tests were made on cultures of plant tissue *in vitro*, or grown "in glass," not on normally growing, whole plants.

Using ten parts per million of gibberellin, Dr. Nickell found both growth stimulation and inhibition occurred. A greater increase took place in root growth of one plant, a member of the sweet clover family, than in tissue from its stem. Growth in sunflower and periwinkle was inhibited, while growth in the tobacco plant was stimulated.

Gibberellic acid's effect depends on the plant species, the part tested and the type of tissue, the scientist concludes. The report, part of the larger study now being prepared, appears in *Nature* (Feb. 15).

Dr. Nickell also concludes that, based on his exploratory study, "no generalities" can be drawn concerning the effects of gibberellins on plants. However, new studies in which the medium is varied along with the type of tissue tested and its source should be helpful in discovering what growth changes are caused by gibberellic acid.

Science News Letter, March 1, 1958

MEDICINE

Chemical Spray May Cause Gradual Poisoning

➤ PARATHION, a chemical spray used on apples, pears, grapes, hops and citrus fruits, it being investigated as a possible factor in causing poisoning among crop workers.

A study of a six-year-period of outbreaks among workers, reported in the *Journal of the American Medical Association* (Feb. 15) by Dr. Griffith E. Quinby of Wenatchee, Wash., and Allen B. Lemmon of Sacramento, Calif., suggests the possibility that the poisoning may be the result of exposure to residues left on plants after they have been sprayed with insecticides.

A striking difference between poisoning produced by direct contact and that of residue contact was that large numbers of workers were affected by residue contact compared to the few cases produced by direct contact with the insecticide.

The residue contact cases are considered milder, and the onset to be more gradual, than the direct contact type.

The study also demonstrated that of those crops examined all had foliage at least chest high, which may mean that workers are poisoned only when dusted or bathed in the dilute residues almost from head to foot.

Science News Letter, March 1, 1958

AGRICULTURE

The Farmer's Fiery Serpents

Nematodes afflict man and animals, but it is because of the huge toll in crops destroyed by these tiny animals that scientists are working on new control methods.

By BENITA TALL

➤ NEMATODES ARE everywhere. So small that most are invisible to the naked eye, these animals are found in deserts, polar seas, on mountain tops and in the waters of hot springs.

They are parasites of man, fish, birds, animals, insects and plant life. In man, nematodes causing disease include hookworm, pinworm and the Trichinella worm that causes trichinosis. While there are 32 known species of nematodes that attack man and many more that infest domestic animals, causing serious losses among cattle and sheep for example, there are more than 1,000 different species of nematodes that attack plants.

The damage these microscopic worms inflict on American farms amounts to $500,000,000 a year. They destroy more than one-tenth of the crops American farmers grow each year.

Nematology: A New Science

Today there is a new agricultural science, nematology. Just a few years ago, however, scientists believed there was only one plant disease caused by one nematode, "the nematode." Now there are many nematodes known to parasitize every kind of plant, from citrus trees to rose bushes, alfalfa, strawberries and potatoes.

The nematodes that live on—and in—plants come uniquely equipped to dine off their hosts. At the front end of their body is a mouth with a hollow, needle-like spear or stylet. Behind this stylet is a muscular esophagus together with digestive glands. A nematode eats by inserting its stylet into a plant cell, in most cases a root cell, and sucking out the plant juices. Some nematodes first inject digestive gland fluid into the cell which "softens up" the plant.

In addition to taking away vital plant fluids, nematodes also damage the plant by mechanical injury. Some pierce through the cell wall in their travels through the plant root rather than moving between cells.

Signs that nematodes have been at work invading and feeding on plant tissues include stunted growth, wilting, leaf discoloration, stunted roots and galls or swellings.

It is partly because none of these symptoms is specific for nematode damage that scientists have overlooked the pests as the causes of so much extensive injury to agricultural crops. Sudden death or reduction in crop yield is not typical of nematode infestations. In most cases the blame has been put on drought, lack of fertilizer or "worn out" soil. The second reason nematodes have only recently received the attention they deserve is a complex one, having to do with evolution, man's farming practices and the nematode's physiology.

Nematodes are primitive animals both in anatomy and in the sense of having been on earth for millions of years. Some scientists believe nematodes that burrow into the muscle tissue of the legs may be the "fiery plague" mentioned in the Bible. They were part of the scene when man began farming.

When a farmer's lands were worn out, or, as was more likely the case, the nematode population became so high that his crop yield was severely reduced, he moved on to untouched soil. On land given over to one-crop farming the problem of nematode infestation was, of course, most serious.

Here the pest is given whole acres of the plant it requires as a "host" and the number of nematodes per acre can build up to several billions. In one way this has been beneficial. Intensive, one-crop farming has helped uncover the nematode menace. With new land scarce and a growing human population to feed, researchers looked for something besides bacteria or insects, drought or tired land that was destroying crops.

Hundreds of "Worms"

What the researchers began to discover, beginning in the 1940's, was that there are literally hundreds of different kinds of nematodes eating away at the farmers' crops. The variety is a challenge to control methods.

Some of these extremely small, soil-borne pests are adapted to living on only one particular plant, others will infest a number of different plants. (Some nematodes attacking animals may grow several feet long, so even small size is not an infallible characteristic.)

Most nematodes are worm-shaped, but some change shape becoming nearly round or kidney-shaped at some stage in their life cycle.

Nematodes have complete reproductive systems with both males and females known to occur. Yet many species have been de-

NEMATODE DAMAGE.—A farmer shows what can happen when crops are grown in nematode-infested soils. Nematodes have gotten at the carrots at the left. The other bunch was grown in soil treated with soil fumigants, such as those developed by Shell Chemical Corporation, one way of controlling nematode damage. The insert, upper left, taken by U. S. Department of Agriculture, shows a dagger nematode, Xiphinema diversicaudatum, *penetrating a root.*

scribed that seem to lack males and asexual methods of reproduction are used by the females. Some females lay as many as 15,000 eggs.

Associated with the nematodes' reproductive processes is a further characteristic that makes some kinds particularly hard to control. This is the resistance of nematode eggs to unfavorable conditions, such as dryness. Some species have been known to lie dormant in the soil for 17 years until conditions were again suitable for growth.

While the usual method of attack is underground, nematodes also feed on plant leaves, stems and flowers. They "swim" along in the thin surface film of water found on the plant parts and on soil until their destination—the plant cell—is reached.

Chemicals for Cures

Chemical compounds are currently being successfully used as nematocides. Applied as soil fumigants, their use has increased farmers' yields in some cases by as much as 25%. Although many control methods seem adapted only to small-scale tests or to expensive cash crops, these chemicals can provide the general farmer with a control method.

Attempts at controlling nematode damage have ranged from electrocution to steaming or flooding the soil, rotating crops, using trapcrops, hatching agents and trying to breed nematode-resistant crops. None of these methods has been successful as a generally acceptable control technique. Some, such as steaming, are suitable for greenhouse use where the affected area is small. Other methods, such as using hatching agents to get the nematode out of its protective cyst, are still in the research stage.

Breeding for Resistance

Some varieties of nematode-resistant alfalfa are being grown commercially, but most known resistant plants are not commercially acceptable. Active breeding programs in developing resistant potatoes, soybeans, cotton and tobacco, among other crops, are now going on in all parts of the world.

Crop rotation has been used, knowingly or not, as a control method for years. When yields of one crop became unprofitably low, the farmer switched to another crop. In cases where the nematode population in the soil had its food supply removed, crop rotation was successful. However, usually there is more than one species of nematode in the soil. The second crop may simply provide the right environment for its growth.

Soil fumigation is probably the most practical control for nematode damage now available to the farmer. It may be used in combination with other methods, such as rotation. Nematocides such as ethylene dibromide, and D-D and Nemagon soil fumigants have been successfully used in field tests and actual farming.

With more nematodes being discovered each year, efforts at finding controls become increasingly necessary. Crops such as the nation's billion-dollar potato crop and the $200,000,000 tomato crop continue to be threatened as long as the fiery serpents are around.

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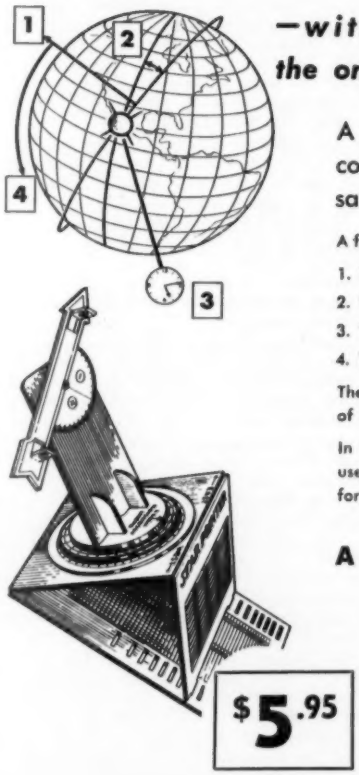

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Books of the Week

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THE ALKALOIDS—K. W. Bentley—*Interscience*, 237 p., illus., $4. Textbook for the undergraduate student.

ANCIENT NOVAE AND METEOR SHOWERS—Hsi Tse-tsung, Susumu Imoto and Ichiro Hasegawa—*Govt. Printing Office*, Smithsonian Contributions to Astrophysics, Vol. 2, No. 6, 34 p., illus., paper, 30¢.

ANTARCTIC PROGRAM OF THE U. S. NATIONAL COMMITTTEE OF THE INTERNATIONAL GEOPHYSICAL YEAR, 1957-58—Joseph Kaplan, Chairman—*Nat'l Academy of Sciences-Nat'l Research Council*, Pub. 553, 58 p., illus., paper, $1. With maps and description of programs and layouts of Antarctic stations.

THE ARCTIC TUNDRA—Delia Goetz—*Morrow*, 64 p., illus. by Louis Darling, $2.50. Of the weather, plant and animal life, and the people who live north of the tree line.

THE BALANCE SHEET ON EDUCATION: Europe, Russia, United States—Admiral Hyman G. Rickover—*Thomas Alva Edison Foundation*, 31 p., paper, single copies free upon request direct to publisher, 8 West 40th St., New York 18, N. Y. Russian education is now "utility model" of European education according to the author.

BASIC NUTRITION—E. W. McHenry—*Lippincott*, 389 p., illus., $6. A textbook for medical students on the scientific and practical aspects of nutrition.

BOUNDARY LAYER EFFECTS IN AERODYNAMICS—L. Howarth and others—*Philosophical Lib.*, 396 p., illus., $12. Proceedings of a symposium held at the British National Physical Laboratory in 1955.

BRIDGES AND THEIR BUILDERS—David B. Steinman and Sara Ruth Watson—*Dover*, 401 p., illus., paper, $1.95. Revised edition of book published in 1941.

CANADIAN RESOURCES: PART I, Alberta, British Columbia, Manitoba, Saskatchewan—*Western Resources Handbook (Stanford Research Inst.)*, unpaged, illus., paper, $10. Statistical information for quick reference.

CAREERS IN BIOCHEMISTRY: Training, Scholarships, Fellowships and Employment Possibilities—Juvenal L. Angel—*World Trade*, Monograph 48, 26 p., illus., $1.

CAVITATION IN HYDRODYNAMICS—P. Eisenberg and others—*Philosophical Lib.*, 424 p., illus., $15. First international symposium held at the National Physical Laboratory, England, in 1955.

CHEMISTRY OF STEROIDS—Charles W. Shoppee—*Academic*, 314 p., illus., $9. Presents structural investigations of sex hormones, adrenocortical hormones, the cardiac glycosides, and the sapogenins.

DIRECTORY OF GEOLOGICAL MATERIAL IN NORTH AMERICA—J. V. Howell and A. I. Levorsen, rev. by Robert H. Dott and Jane Weaver Wilds—*Am. Geological Inst.*, NAS-NRC Pub. No. 556, 2nd ed., 208 p., $3.

ELEMENTARY QUANTITATIVE ANALYSIS—Harold F. Walton—*Prentice-Hall*, 342 p., illus., $5.75. Intended for a one-semester course.

EXPERIMENTS WITH LIGHT—Nelson F. Beeler and Franklyn M. Branley—*Crowell*, 143 p., illus. by Anne Marie Jauss, $2.75. Explains what we know about light and how we obtained the information, presents experiments to test the facts using inexpensive materials.

THE FOUNDATIONS OF LIFE SCIENCE—Mark Graubard—*Van Nostrand*, 627 p., illus., $6.50. To serve as a biological science textbook in a college course of general science.

GAS TURBINE MATERIALS: A Survey of High-Temperature Materials and Their Application to the Gas Turbine—G. Lucas and J. F. Pollock—*Macmillan*, 163 p., illus., $5.75. On the manufacture, properties and use of special materials for gas turbines.

THE HARVEY LECTURES: Delivered Under the Auspices of the Harvey Society of New York, 1956-1957—T. F. Gallagher and others—*Academic*, 312 p., illus., $7.50. Covering aspects of medical science.

HIGHWAY RESEARCH BOARD, PROCEEDINGS OF THE THIRTY-SIXTH ANNUAL MEETING—Fred Burggraf, Elmer M. Ward and Herbert P. Orland, Eds.—*Highway Research Board*, 834 p., illus., $10. Conference held January 1957.

AN INTRODUCTION TO SCALE COORDINATE PHYSICS: An Introduction to the Formalization of the Macro Operational Point of View—William Bender—*Burgess*, 340 p., illus., $7.50. Proposes alternative scheme of comprehension of quantum empirics.

LANDSLIDES AND ENGINEERING PRACTICE—Edwin B. Eckel, Ed.—*Highway Research Board*, Special Report 29, 232 p., illus., $6. Prepared by Committee on Landslide Investigations.

LECTURES ON NUCLEAR THEORY—C. Landau and Ya. Smorodinsky—*Consultants Bureau*, 82 p., illus., paper, $15. Original text published in Russian by State Technical-Theoretical Literature Press, Moscow, 1955.

LITERATURE OF AGRICULTURAL RESEARCH—J. Richard Blanchard and Harald Ostvold—*Univ. of Calif. Press*, 231 p., $5. Quantity of publications and inadequacy of indexes and bibliographies in this field make this annotated bibliography a welcome contribution.

A MANUAL OF PAPER CHROMATOGRAPHY AND PAPER ELECTROPHORESIS—Richard J. Block, Emmett L. Durrum and Gunter Zweig—*Academic*, 2nd ed., 710 p., illus., $12.80. A practical manual of tried and proved procedures, with classified bibliography of over 1800 articles.

MEN AGAINST THE FROZEN NORTH—Ritchie Calder—*Macmillan*, 279 p., illus., $3.75. By airplane, dogsledge and snow-tractor the author explores the Arctic to see what scientists can do to make this region habitable.

NATURALLY OCCURRING QUINONES—R. H. Thomson—*Academic*, 302 p., illus., $9. Comprehensive account of quinone pigments which form the largest group of natural coloring matters.

THE NAVAL ARCHITECTURE OF SMALL CRAFT—D. Phillips-Birt—*Philosophical Lib.*, 351 p., illus., $15. Concerned with many types of working boats and yachts of about 120 feet in length or less.

PHYSICAL METHODS OF PHYSIOLOGY—W. T. Cotton—*Philosophical Lib.*, 375 p., illus., $10. Presents wide variety of physical experimental techniques and theoretical treatments which have been applied to physiological investigations.

POWER REACTOR TECHNOLOGY, Vol. I, No. 1—General Nuclear Engineering Corporation for U. S. Atomic Energy Commission—*Govt. Printing Office*, 41 p., illus., paper, single copies 55¢, $2 per year. New quarterly in AEC's Technical Progress Review Series.

PROCESS ENGINEERING IN THE FOOD INDUSTRIES—R. J. Clarke—*Philosophical Lib.*, 355 p., illus., $10. For those responsible for the management of plant installations.

THE RIVER IN THE SEA—Hans Leip, translated from the German by H. A. Piehler and K. Kirkness—*Putnam*, 223 p., illus., $3.75. Follows the course of the Gulf Stream.

RUSSIAN-ENGLISH GLOSSARY OF SOLID STATE PHYSICS—I. Emin, Ed.—*Consultants Bureau*, 90 p., paper, $10. Specialized terms in the fields of crystallography, physics of metals, ferromagnetism and semi-conductors.

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MEDICINE

Chemical Allows Mice to Survive Lethal X-Ray Dose

➤ A CHEMICAL that helps mice survive lethal doses of X-rays is now undergoing further tests at the National Institutes of Health, Bethesda, Md.

Dr. Willie W. Smith of the National Cancer Institute reports her preliminary studies on the protective effect of colchicine in mice exposed to X-radiation, in *Science* (Feb. 14). She found survival was "considerably better" in mice that had been given the colchicine compound than in untreated mice exposed to the same radiation level.

Dr. Smith said the greatest difference in survival rate was about equivalent to an X-ray dose reduction of 20%. In five experiments with 75 mice, no untreated mice survived as long as two weeks after exposure to a 1,100-roentgen level in a Van de Graaff generator. Of those given an injection of trimethyl colchicinic acid methyl ether d-tartrate 24 hours before exposure to the same X-ray dose, from 45% to 80% survived 28 days.

Colchicine is a chemical now used extensively to breed new and more valuable plants, because it doubles the number of chromosomes when applied to germinating seeds or growing stem tips. It is also used to double the chromosome number of sterile hybrids produced by crossing widely separated species, resulting in fertile, pure-breeding hybrid species.

Dr. Smith is now studying whether this change in the survival rate after X-ray exposure is connected with the effect of colchicine on cell division.

Science News Letter, March 1, 1958

MEDICINE

Atomic Fallout Effects Duplicated in Pigs

➤ SKIN LESIONS in pigs resembling those caused by atomic radiation have now been reproduced in the laboratory for the first time, Col. Carl F. Tessmer, Armed Forces Institute of Pathology, Washington, D.C., reported to the American Academy of Dermatology and Syphilology meeting in Chicago.

The skin changes duplicated the ones that were caused by beta radiation from atomic fallout on cattle in New Mexico in 1945 and on the Marshall Islanders accidentally exposed during Pacific tests in 1954, Col. Tessmer reported.

These two accidental exposures to beta radiation represent probably the most severe lesions of the skin to be expected from fallout. Experimental duplication of them will help in a study of the complete life-cycle of the skin condition.

The lesions were produced in miniature pigs by a Van de Graaff accelerator and could be varied in depth and intensity.

While the major hazard in atomic fallout is still the more penetrating gamma or X-rays, which damage internal body organs, relatively serious skin damage and long-term changes in the skin are possible due to the beta particles or "electrons."

Science News Letter, March 1, 1958

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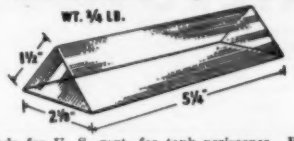

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Questions

AGRICULTURE—How do nematodes attack plants? p. 138.

ICHTHYOLOGY—Why is the discovery of tuna larvae important to scientists? p. 137.

MEDICINE—What effect does stress have on the body's cholesterol? p. 132.

METEOROLOGY—What are three theories given to explain the gradually increasing temperature of the earth's atmosphere? p. 134.

Photographs: Cover, Erwin Muller; p. 131, Emerich C. Gross; p. 133 and 135, Sperry Gyroscope Company; p. 134, Allegheny Ludlum Steel Corporation; p. 138, U. S. Department of Agriculture and Shell Chemical Corporation; p. 144, The Photographic Survey Corp., Ltd., Canada.

MEDICINE

Anticoagulant Drug Helps Asthma Also

➤ AN ANTICOAGULANT drug used in heart patients has been found to help bronchial asthma as well as blood circulation.

This is reported by Drs. Harold Blumberg, Hyman B. Dayton and Samuel M. Gordon, Endo Laboratories Inc., Richmond Hill, N. Y., in *Science* (Jan. 24).

The anticoagulant is warfarin, or Coumadin, sodium and, after its anti-asthma effects were noted in several heart patients, it was tested on the windpipes of guinea pigs. The scientists found the drug had a definite dilating ability and was about half as effective as aminophylline, widely used asthmatic drug.

"It has been pointed out that some of the beneficial action of anticoagulants in myocardial infarction (heart attacks) may be due to properties other than that affecting coagulation," the scientists report.

The initial dose of the anticoagulant in humans could possibly produce an immediate dilation of the bronchial tubes as well as starting the slower anticoagulant action, they conclude.

Science News Letter, March 1, 1958

Do You Know?

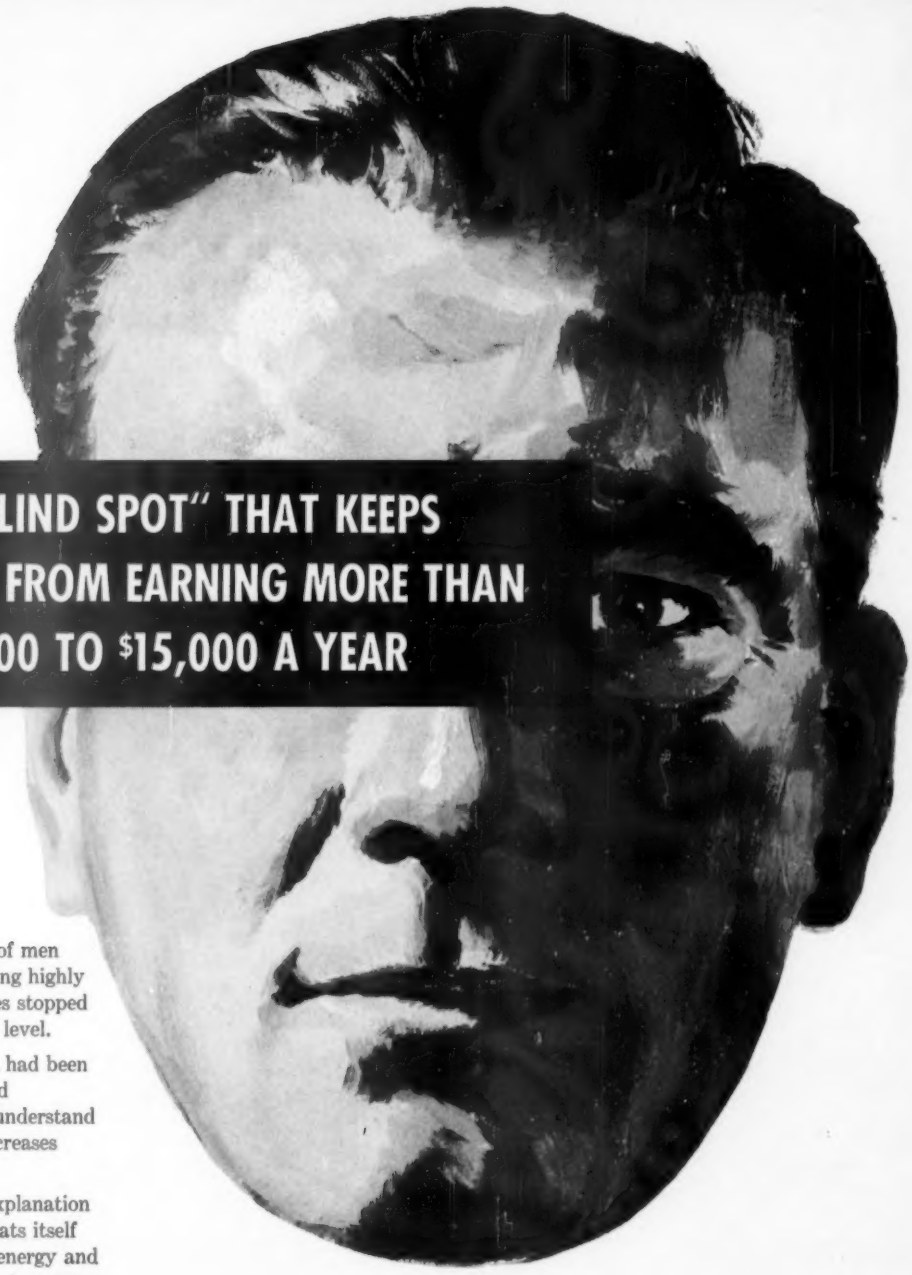
More than two million different colors can be distinguished by a recording *spectrophotometer*, while a human eye can distinguish only about 100,000.

The 52.40 pounds of *aluminum* now used in each car makes possible a weight saving of 100 to 150 pounds in the average car.

One pound of *uranium* contains the energy equivalent of 2,700,000 pounds of coal.

A manned balloon telescope is being prepared to observe *Mars* at its next closest approach to the earth in November of 1958.

New electrical *insulation* is so heat resistant that a 1/1000-inch thickness of it can block the flame of a blow torch.



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LICENSE PLATE HOLDER is made for the new standardized, 6-inch by 12-inch plates. The holder is molded of a butyrate plastic in two parts: a gray back plate and a clear cover hinged to the back plate at the bottom. It can be attached to the car bracket with supplied nuts and bolts.

Science News Letter, March 1, 1958

METAL BAT for young softball players is designed to take a beating. Made from a hollow aluminum tube, the bat is described as unbreakable and weatherproof. It is available in 31- and 33-inch lengths.

Science News Letter, March 1, 1958

MECHANICAL LIFTER is a one-piece all-steel welded helper that offers vertical lift of 69 inches from floor level. A cable winch reduces handle effort to 27 pounds at full load. Lifting speed is one and one-half inches per handle revolution. The lifter's platform is 24 inches square and has 1,000-pound capacity.

Science News Letter, March 1, 1958

PORTABLE ELECTRONIC TOOL for the prospector, shown in the photograph, can be used to hunt for sulfide ores such as copper, lead and zinc. A two-man electromagnetometer, the ore locator consists of a coil suspended around the waist of

the operator by shoulder harnesses. One wears a receiving coil, and the other a transmitting coil. The two pieces of equipment are connected by a 200-foot cable.

Science News Letter, March 1, 1958

TELEVISION CHAIR for Mickey Mouse fans weighs only one and one-half pounds. Made with a lightweight aluminum alloy frame, the child-sized seat portion is of washable canvas. The chair is personalized with junior's name and can be folded away when not in use.

Science News Letter, March 1, 1958

PLASTIC SHIELD for research personnel and others who must observe molten metal or extremely hot objects offers protection against radiant heat above 2,000 degrees Fahrenheit. A coating that reflects infra-red rays is applied under vacuum to the shatterproof, transparent visor.

Science News Letter, March 1, 1958

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Science News Letter, March 1, 1958

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Science News Letter, March 1, 1958

Nature Ramblings

By HORACE LOFTIN

The Gnawing Mammals

A GLINT of white beneath the uniform brown of winter grass caught the naturalist's eye. He halted, picked the object up and gazed at it with an expression of disbelief on his face. It was the skull of a small animal, a woodchuck. But, extending out from the upper jaw, were two enormous tusk-like teeth. One of these spiraled alongside the snout, reminding him of the tusk of a mastodon. The other tooth curled back on itself to pierce the roof of the animal's mouth!

What had happened?

The woodchuck is a member of the order of rodents, or Rodentia. This group of gnawing mammals is characterized by two pairs of incisor teeth like four powerful chisels at the front of the jaws. Unlike the teeth of most other mammals, these incisors

grow throughout the lifetime of the animal. One scientist, studying the rat, found that this roden't four incisors grew some 20 inches in a year.

The back of these teeth lack the hard cover of enamel common to most teeth, however, and the opposing incisors keep them worn down to a sharp edge by constant gnawing. Thus, normal usage keeps the growing teeth at a regular length.

In the case of the woodchuck skull, apparently by some accident the animal had lost his two lower incisors. With no opposing teeth to grind against, the upper incisors grew without hindrance. He soon found himself unable to gnaw with these monstrous teeth, and death by slow starvation resulted, unless some predator dispatched the weakened animal.

Accidents like this one are rare, of course, and the "self-sharpening" chisels of the rodents have contributed to the great success of the rodents as a group.

Other adaptations of these animals for a life of gnawing are the lack of canine teeth and special changes in the molars for grinding. The lower jaw is hinged to the skull so that it can move up and down, backwards and forwards, and sideways!

Science News Letter, March 1, 1958